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TITLE

TWIG DAMAGE IN SUGAR PINE CAUSED BY CONE BEETLE

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G. H. Struble

The sugar pine cone beetle, Conophthorus lambertianae Hopk., is normally a destructive pest of immature cones. It breeds in the cones with the result that often as much as 90 percent of the seed crop may be destroyed in a single year in certain localities. This pest was studied in detail over thirty years ago, the results of which were published in a Department bulletin by Miller 1/ in 1915. The biology and many of the habits were revealed and also much was learned as to the effect of this scolytid upon the sugar pine seed crop.

1/ Miller, J. M., 1915. Cone Beetles: Injury to Sugar Pine and Western Yellow Pine. Bulletin No. 243. U. S. Department of Agriculture. July 24, 1915.

Recently a twig-mining habit of this beetle was discovered, which had previously escaped observation. This mining of twigs causes limited damage throughout the crowns of many sugar pines of varying age and vigor. This habit was observed first in the vicinity of Shaver Lake in Fresno County, California, on September 28, 1945, by J. M. Miller and the writer. Our attention to it was attracted by numerous fading twig ends which in full sunlight caused them to stand out in contrast to the green crowns. Examinations of several affected twigs revealed one adult Conophthorus to each twig. These had entered just posterior to the terminal bud and bored down the center of the stem for distances varying from one to two inches. (See photographs.) Death to each affected twig tip or end followed shortly after attack.

Later observations in October 1945 revealed that twig killing in sugar pines was rather widespread. Heaviest centers of infestation were found in the vicinity of Chinquapin, Merced Grove, and Crane Flat in Yosemite National Park. Lighter killings were observed in Mariposa Grove in Yosemite National Park, and in Chiquito Basin, Sierra National Forest. Many of the intervening areas of virgin and second growth sugar pine stands appeared free from infestations.

Variations in amount of twig killing appeared to be associated with mature cone production. Sugar pines in areas where mature cones were lacking were the most heavily flagged, and conversely, the trees in areas where there was a full crop of mature cones were free from flagged twigs. This apparent association probably results from beetles which emerge from aborted infested cones of the current year's seed crop which lay on the forest floor.

According to Miller 1/ the beetles establish their broods in the young immature cones of the current crop when they are 2½ to 8 inches long during May and June. This causes the cones to shrivel and die, and nearly all of them fall to the ground during August when the broods reared inside are in the new adult stage. Many of the adults were found to hibernate within the aborted cones during the long fall and winter period and this was stated as the normal habit of the insect. Miller states, however: "In August 1913 an emergence of a considerable portion of the new generation of beetles was noted in northern California and southern Oregon. No subsequent attacks were observed on the nearly mature cones of the 1913-14 crop or upon the newly formed 1913-14 cones."

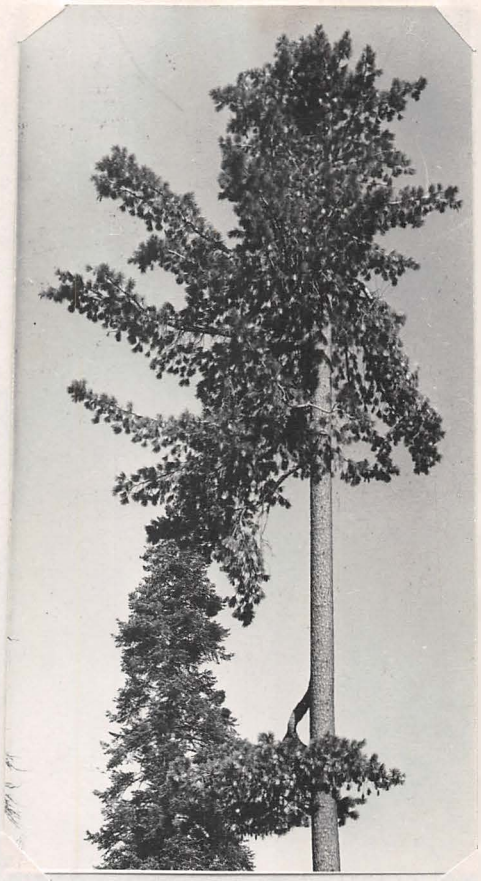
The discovery of the twig-mining habit of this beetle indicates that emergence of at least a part of the broods reared in the cones occurs in certain years during August and September and that these emerged beetles attack the twigs ~~(where they feed)~~. Presumably it is the older beetles of a given brood that emerge, the younger ones remaining within the cone because the advent of colder weather forces them to hibernate before they are fully mature.

The significance of the habit is not fully understood. Among some other scolytids, notably Phloeosinus, and certain buprestids twig feeding is required for sexual maturity. This might be presumed to be the case also with Conophthorus. However, attacks are not made on the cones until the following May or June, long after feeding, and following winter hibernation.

It is not known where the cone beetles that mine twigs in the fall spend the winter. It was at first thought that they would hibernate within the mined twigs, but examinations late in the fall revealed about 90 percent of the flagged twigs were abandoned. Thus it was indicated that these insects sought protection for the winter in places offering greater security than within the twigs.

The effect of the twig killing is not looked upon as particularly damaging to the tree as a whole. This is because the amount of foliage which is destroyed is relatively small compared to the total foliage complement, even in those trees in which a large percentage of the twigs are flagged. This habit, however, is of scientific interest as it brings out a new phase of the seasonal activities of a well known forest insect.

A



B

C

Twig-mining habit of Conophthorus lambertianae Hopk. (A) Aborted sugar pine cones infested by cone beetle broods. Some of the maturing adults emerge in the fall and mine sugar pine twigs. (B) Sugar pine with many of its twig ends flagged as a result of the twig-mining habit. (C) Close up of flagged twig end.